

**ABSTRACT OF THE DISCLOSURE**

Diamond heat spreaders are produced having thermal properties approaching that of pure diamond. Diamond particles of relatively large grain size are tightly packed to  
5 maximize diamond-to-diamond contact. Subsequently, smaller diamond particles may be introduced into the interstitial voids to further increase the diamond content per volume. An interstitial material is then introduced which substantially fills the remaining voids and should have favorable thermal properties as well as form chemical bonds with the diamond. Alternatively, the packed diamond may be subjected to ultrahigh pressures  
10 over 4 GPa in the presence of a sintering aid. The resulting diamond heat spreader has diamond particles which are substantially sintered together to form a continuous diamond network and small amounts of a sintering agent. The final heat spreader exhibits superior heat transfer properties advantageous in removing heat from various sources such as electronic devices and minimized difference in thermal expansion from the heat source.